Procedures for Calibration and Maintenance of Instruments

1 Introduction

Instruments used in the Trace Evidence Unit (TEU) and Scientific and Biometrics Analysis Unit - Trace (SBAU-Trace) that require calibration and/or performance monitoring are listed below. For specific guidelines regarding the calibration procedures for the instrument, including the origin and certification of specific instrument standards, please refer to the referenced protocols.

2 Scope

This document applies to individuals within the TEU and SBAU-Trace who perform examinations in the Hairs and Fibers, Geology, and Anthropology disciplines.

3 Instruments Requiring Internal Calibration/Alignment Verification (Complete list of instruments maintained within the appropriate unit)

The following instruments used in the TEU and/or SBAU-Trace require internal calibration/alignment verification:

3.1 Microspectrophotometers

3.1.1 Refer to the *Performance Monitoring Protocol for Microspectrophotometers* for guidance on calibration verification.

3.1.2 Verification of calibration of the instrument is performed each day the instrument is used. Refer to the *Performance Monitoring Protocol for Microspectrophotometers* for acceptance criteria.

3.1.3 Calibration verification records will be maintained with the instrument.

3.2 Fourier Transform Infrared Spectrometers

3.2.1 Refer to the *Performance Monitoring Protocol for FT-IR Systems* for guidance on calibration verification.

3.2.2 Verification of calibration of the instrument is performed each day the instrument is used. Refer to the *Performance Monitoring Protocol for FT-IR Systems* for acceptance criteria.

3.2.3 Calibration verification records will be maintained with the instrument.

3.1 Malvern-Panalytical Empyrean X-ray Diffractometer

3.1.1 Refer to the *X-ray Powder Diffractometry Using the Empyrean X-ray Diffractometer* protocol for guidance on alignment verification.

3.1.2 Perform alignment verification monthly while the instrument is in use, or prior to next use when the instrument has been idle for more than one month. Refer to the *X-ray Powder Diffractometry using the Empyrean X-ray Diffractometer* protocol for specific acceptance criteria.

3.1.3 After any service that may affect instrument alignment, verify that the alignment of the instrument and all performance criteria are met before placing the instrument back in service.

3.1.4 Alignment verification records and/or logs will be maintained adjacent to the instrument and/or on the system computer.

4 Instruments Requiring Internal Calibration (Complete list of instruments maintained within TEU)

4.1 Glass Refractive Index Measuring System (GRIM3)

4.1.1 Refer to the *Refractive Index of Glass by GRIM* protocol for guidance on calibration.

4.1.2 Calibrate the GRIM3 annually, according to manufacturer's specifications or as needed. Refer to the *Refractive Index of Glass by GRIM* protocol for specific acceptance criteria.

4.1.3 Calibration records will be maintained adjacent to the instrumentrs and/or on the system computer.

4.2 ThermoFisher iCAP 6500 Duo Inductively Coupled Plasma – Optical Emission Spectrometer (ICP-OES)

4.2.1 Refer to the *Elemental Analysis of Glass by Inductively Coupled Plasma – Optical Emission Spectrometry (ICP-OES)* protocol for guidance on calibration.

4.2.2 At a minimum, calibrate the ICP-OES prior to each analytical run. Refer to the *Elemental Analysis of Glass by Inductively Coupled Plasma – Optical Emission Spectrometry (ICP-OES)* for specific acceptance criteria.

4.2.3 Calibration records will be maintained in the case files when ICP-OES is performed and on the system computer.

4.3 ThermoFisher iCAP RQ Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) with NWR UP213 Nd:YAG Laser Ablation System

4.3.1 Refer to the *Elemental Analysis of Glass by Laser Ablation Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS)* protocol for guidance on calibration.

4.3.2 At a minimum, calibrate the LA-ICP-MS prior to each analytical run. Refer to the *Elemental Analysis of Glass by Laser Ablation Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS)* protocol for specific acceptance criteria.

4.3.3 Calibration records will be maintained in the case files when LA-ICP- MS is performed and on the system computer.

5 Instruments Requiring External Calibration/Alignment (Complete list of instruments maintained within the appropriate unit)

5.1 Balances

5.1.1 Balances are calibrated on an annual basis by an ISO 17025 accredited laboratory to manufacturer's specifications.

5.1.2 A record of calibration will be maintained with the instrument.

5.2 Micrometers/Calipers/Gauges

5.2.1 These are calibrated on an annual basis by an ISO 17025 accredited laboratory to manufacturer's specifications, if used for critical measurements.

5.2.2 Certificates of calibration dates will be maintained in Resource Manager.

5.3 Balance Weights

5.3.1 These weights are recertified on a biennial basis by an ISO 17025 accredited laboratory to manufacturer's specifications.

5.3.2 Certificates of conformance will be maintained on the UNET.

5.4 Malvern-Panalytical Empyrean X-ray Diffractometer

5.4.1 The alignment of the XRD is verified an annual basis by an outside vendor, and if necessary, they will re-align the system.

5.4.2 Refer to the alignment and maintenance logs maintained adjacent to the instrument and vendor service summaries maintained on the system computer for the documentation of service visits.

6 Instruments Requiring Maintenance

6.1 Microscopes are cleaned and serviced yearly by an outside vendor. A list of microscopes by unit requiring yearly maintenance will be maintained within the appropriate unit. A microscope will not be considered out of service unless it has not been serviced within a year and a half of its last service.

6.1.1 Microscopes used for trace evidence examinations at a non-FBI Laboratory controlled space will be assessed prior to use. This assessment will include performing modified Kohler illumination and color balancing, if appropriate. This assessment will be recorded in the examination notes. Any irregularities observed during this assessment will also be recorded in the examination notes.

Rev. #	Issue Date	History
5	02/03/2020	Updated SBAU-Trace group name throughout. Changed 'geological' to 'geologically-derived' in Scope. Changed lists to be maintained within units. Updated TE QA document names throughout. Updated wording in Sections 4.1.2 and 6. Added section 6.1.1. Removed all reference to PANalytical X'Pert Pro XRD. Added calibration/certification specifications and laboratory requirements to Sections 5.1.1, 5.2.1, and 5.3.1.
6	05/03/2021	Scope updated to include new discipline descriptions. Added Section 3.1, 4.3, and 5.4

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Approval

Trace Evidence Unit Chief: Date: 04/30/2021

Scientific and Biometrics Analysis Unit Chief: Date: 04/30/2021

Hairs and Fibers Technical Leader: Date: 04/30/2021

Geology Technical Leader: Date: 04/30/2021

Anthropology Technical Leader: Date: 04/30/2021

QA Approval

Quality Manager: Date: 04/30/2021